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PATENT ABSTRACTS OF JAPAN

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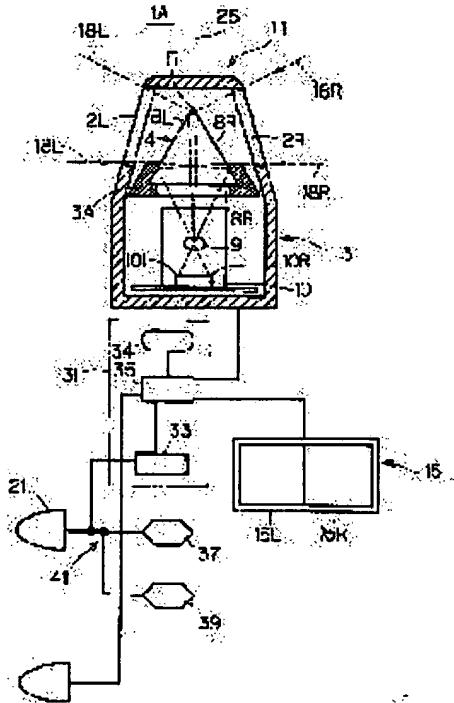
(22)Date of filing : 28.02.2001 (72)Inventor : ITO TAKANORI

(54) DEVICE FOR VISIBLE IDENTIFICATION AROUND VEHICLE

(57)Abstract:

PROBLEM TO BE SOLVED: To increase the display quality of a picked-up image when a vehicle is laid in dark circumstances.

SOLUTION: When a turn indicator lamp 21 is repeatedly flickered, the image picked up by an imaging element 10 is stored as a static image in storage means 23 during lighting on the turn indicator lamp 21 and the static image stored in the storage means 34 is displayed on a display part 15 during lighting off the turn indicator lamp 21, preventing the flickering of the image on the display part 15 with the flickering of the turn indicator lamp 21. Therefore, the deterioration of the visibility of the display part 31 can be prevented.



LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] When, as for said display-control means, said signal burning detection means detects the flash condition of said winker lamp by having the following While displaying at least said static image which said winker lamp is blinking and which was memorized in said storage means at the time of putting out lights on said display Car circumference check-by-looking equipment characterized by displaying the image picturized with said image sensor on said display when said signal burning detection means does not detect the flash condition of said winker lamp. It is a signal burning detection means by which are car circumference check-by-looking equipment which picturizes the image of the car side using the image pick-up equipment installed in the position of the exterior of a car, transmits the image concerned to a control section, and is displayed on a predetermined display by control by the control section concerned, and said control section detects the flash condition of the winker lamp of said car. A storage means to memorize the image which it was detected with said signal burning detection means that said winker lamp is a flash, and was picturized with said image sensor when it was in the burning condition which the winker lamp concerned is blinking as a static image A display-control means to choose suitably the image memorized by said storage means based on the detection result of said signal burning detection means, and the image pick-up image given from said image sensor, and to display on said display

[Claim 2] It is car circumference check-by-looking equipment according to claim 1. Said display-control means When it is the case where the headlight of said car is turned on and said signal burning detection means detects the flash condition of said winker lamp While displaying at least said static image which said winker lamp is blinking and which was memorized in said storage means at the time of putting out lights on said display Car circumference check-by-looking equipment characterized by displaying the image picturized with said image sensor on said display when the headlight of said car is not turned on, and when [although the headlight of said car is turned on,] said signal burning detection means does not detect the flash condition of said winker lamp.

[Claim 3] It is car circumference check-by-looking equipment characterized by to display said static image which it is car circumference check-by-looking equipment according to claim 2, and said display-control means is the case where the headlight of said car is turned on, and is the frame rate which synchronized with the flash period of said winker lamp when said signal burning detection means detected the flash condition of said winker lamp, and was memorized in said storage means on said display.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is in the bad situation of a prospect, and relates to the car circumference check-by-looking equipment which photos the scene of the exterior used as an operator's dead angle, and is displayed on an operator.

[0002]

[Description of the Prior Art] In order to make operation easy at the bad crossing of a prospect etc., there is a technique of grasping the situation of the exterior which serves as an operator's dead angle with installation and this car circumference check-by-looking equipment in car circumference check-by-looking equipment in the point of a car etc. The block diagram of conventional car circumference check-by-looking equipment is shown in drawing 3. This car circumference check-by-looking equipment 1 is equipped with the image pick-up equipment 11 which is arranged in the car exterior and picturizes the scene of the longitudinal direction of car anterior part, the mirror image reversal process section 12 which carries out the mirror image reversal process of the picture signal supplied from this image pick-up equipment 11, and the display 15 which displays the picture signal which is arranged in the vehicle interior of a room, and is acquired from the mirror image reversal process section 12, and is constituted.

[0003] Image pick-up equipment 11 has the case 3 of protection-from-light nature where the transparency window parts 2L and 2R of a left Uichi pair which consisted of clear glass etc. were formed in the both sides. In this case 3, the prism 4 of a cross-section isosceles triangle turns that vertical-angle section 5 at the anterior part (drawing 3 upper part of a case 3) of a case 3. And while receipt arrangement is carried out with the position which turned the prism side faces 8L and 8R to the on either side transparency window part 2L and 2R side, respectively Receipt arrangement is carried out and the image sensor 10 which changes into a picture signal the beams of light 18L and 18R which carry out incidence from the prism side faces 8L and 8R, carry out optical-path conversion within prism 4, and are guided on an image pick-up side through the predetermined image formation lens 9 is constituted at the backside [prism 4]. In that case, in the back (drawing 3 lower part) of this prism 4, the image formation lens 9 is arranged so that the optical axis 25 of that image formation lens 9 may be in agreement with the 2-minute line of the vertical-angle section 5 of the cross-section isosceles triangle of prism 4.

[0004] As this image pick-up equipment 11 turns the anterior part (anterior part of a case 3) of image pick-up equipment 11 ahead of a car and turns the transparency window parts 2R and 2L to left right-hand side, respectively, it is attached in the front bumper 17 and front grille of a car 16 like drawing 4 .

[0005] In this condition, as shown in drawing 3 , after beam-of-light 18L corresponding to a left-hand side scene penetrates transparency window part 2L and prism side-face 8L, it advances the interior of prism 4 and reaches prism side-face 8R. And after carrying out internal reflection by this prism side-face 8R, it injects from prism rear-face 8B, image formation is carried out with the image formation lens 9, and it shows around at left half plane 10L of the image pick-up side of an image sensor 10.

[0006] By thinking on this and a symmetrical target, it shows around similarly at right half plane 10R of the image pick-up side of an image sensor 10 about beam-of-light 18R corresponding to a right-hand side scene. And it is changed into a picture signal with both the image sensors 10.

[0007] Thus, left-hand side and a right-hand side scene are picturized, the mirror image reversal process of the picturized picture signal is carried out in the mirror image reversal process section 12, and it is supplied to a display 15 as a monitor visual field image like drawing 5 . In a display 15, the left-hand side scene incorporated from transparency window part 2L is displayed on left half screen 15L as left-hand side scene image 19L, and the right-hand side scene incorporated from transparency window part 2R is displayed on right half screen 15R as right-hand side scene image

19R. Therefore, when access objects, such as a car, have approached in the bad location of a prospect, an operator is checking the screen of a display 15 by looking and it becomes possible to recognize the access object.

[0008]

[Problem(s) to be Solved by the Invention] By the way, in dark locations, such as night, even if a car 16 turns on a headlight (head lamp) 20 and a tail light (back light: graphic display abbreviation) in drawing 4, since the optical exposure range of the headlight 20 and tail light is limited to the front or back, the optical exposure of the longitudinal direction of a car can be carried out neither by the headlight 20 nor the tail light.

[0009] Here, when carrying out right left turn of the crossing etc. generally, it is obliged to turn on a turn signal with the winker lamp 21. Since the turn signal of this winker lamp 21 is what performs an optical exposure towards the anterior part longitudinal direction of a car 16, if it picturizes with image pick-up equipment 11 at the time of the optical exposure of the turn signal to this anterior part longitudinal direction, it will become possible [obtaining a bright image].

[0010] However, since the turn signal of the winker lamp 21 is what blinks light a fixed period, it is impossible for performing the optical exposure which followed the anterior part longitudinal direction. Therefore, if an anterior part longitudinal direction is picturized with image pick-up equipment 11, since the anterior part longitudinal direction of a car 16 will change and will change by carrying out a light-and-darkness condition a fixed period, blinking the winker lamp 21 in dark locations, such as night, the screen eventually displayed on a display 15 will blink repeatedly, and visibility will deteriorate extremely.

[0011] Then, in case the object of this invention picturizes the image of the anterior part longitudinal direction concerned using the turn signal in a winker lamp, it is to offer the car circumference check-by-looking equipment which may improve the visibility of the content of an image.

[0012]

[Means for Solving the Problem] That the above-mentioned technical problem should be solved invention according to claim 1 Picturize the image of the car side using the image pick-up equipment installed in the position of the exterior of a car, and the image concerned is transmitted to a control section. It is car circumference check-by-looking equipment displayed on a predetermined display by control by the control section concerned. Said control section It is detected by a signal burning detection means to detect the flash condition of the winker lamp of said car, and said signal burning detection means that said winker lamp is a flash, and when it is in the burning condition which the winker lamp concerned is blinking A storage means to memorize the image picturized with said image sensor as a static image, It has a display-control means to choose suitably the image memorized by said storage means based on the detection result of said signal burning detection means, and the image pick-up image given from said image sensor, and to display on said display. When said signal burning detection means detects the flash condition of said winker lamp, said display-control means While displaying at least said static image which said winker lamp is blinking and which was memorized in said storage means at the time of putting out lights on said display When said signal burning detection means does not detect the flash condition of said winker lamp, the image picturized with said image sensor is displayed on said display.

[0013] Invention according to claim 2 is car circumference check-by-looking equipment according to claim 1. Said display-control means When it is the case where the headlight of said car is turned on and said signal burning detection means detects the flash condition of said winker lamp While displaying at least said static image which said winker lamp is blinking and which was memorized in said storage means at the time of putting out lights on said display When the headlight of said car is not turned on, and when [although the headlight of said car is turned on,] said signal burning detection means does not detect the flash condition of said winker lamp, the image picturized with said image sensor is displayed on said display.

[0014] Invention according to claim 3 is car circumference check-by-looking equipment according to claim 2, and said display-control means is the case where the headlight of said car is turned on, and it is the frame rate which synchronized with the flash period of said winker lamp when said signal burning detection means detected the flash condition of said winker lamp, and said static image memorized in said storage means is displayed on said display.

[0015]

[Embodiment of the Invention] Hereafter, the gestalt of operation of one of this invention is explained based on drawing 1. Drawing 1 is the configuration schematic diagram of car circumference check-by-looking equipment 1A concerning the gestalt of operation of one of this invention. In addition, with the gestalt of this operation, the same sign is attached about the element which has the same function as the conventional example shown in drawing 3 thru/or drawing 5.

[0016] Car circumference check-by-looking equipment 1A concerning this operation gestalt The image pick-up equipment [in / as shown in drawing 1 and drawing 4 / a car 16] 11 installed, for example under the front bumper 17 etc., The display 15 which consists of LCD or CRT prepared in the location which operators, such as an instrument

panel of the vehicle interior of a room, tend to check by looking that the image of the car circumference picturized with image pick-up equipment 11 should be displayed, It has the control section 31 which carries out the image processing of the picture signal picturized with image pick-up equipment 11, and is supplied to a display 15.

[0017] The same thing as the conventional example which showed image pick-up equipment 11 to drawing 3 is used. The transparency window parts 2L and 2R of a left Uichi pair with which opening which the case 3 of protection-from-light nature and translucency resin, such as PMMA, were used, and image pick-up equipment 11 was located in the both-sides side of a case 3, and was formed in each was equipped concretely, The image sensors 10 arranged in a case 3, such as a CCD camera, It has the image formation lens 9 and the prism 4 which carries out optical-path conversion, respectively and shows the beams of light 18L and 18R which advanced from each transparency window parts 2L and 2R through the image formation lens 9 to left half plane 10L or right half plane 10R of an image pick-up side of an image sensor 10.

[0018] Translucent plates, such as clear glass, are used as transparency window parts 2L and 2R.

[0019] ** material BK 7 (refractive index n:1.517) is used, and prism 4 is formed in the prism object of a cross-section isosceles triangle. The vertical-angle section 5 of this prism 4 is the position which has been arranged towards the front (drawing 1 upper part of a case 3) of a case, and turned those prism side faces 8L and 8R to the transparency window parts 2L and 2R of a case 3, respectively, for example, fixed maintenance is carried out by prism holddown-member 3A, and it is arranged in the case 3. in addition, this prism holddown-member 3A -- the right-and-left corner of the back (drawing lower part) of prism 4 -- from left right-hand side -- for example, while pinching and fixing prism 4, it serves as the work which shades the unnecessary beam of light which does not constitute the left right-hand side scene which carries out incidence to the back field (drawing 1 lower field of the prism side faces 8R and 8L) of the prism side faces 8R and 8L.

[0020] Moreover, in the back (drawing 1 lower part) of this prism 4, the image formation lens 9 is being fixed so that the optical axis 25 of that image formation lens 9 may be in agreement with the 2-minute line of the vertical-angle section 5 of the cross-section isosceles triangle of prism 4. And in the back of the image formation lens 9, the image sensor 10 is being fixed so that the image pick-up sides 10L and 10R may become parallel to prism rear-face 8B and the core of the borderline of left half plane 10L of the image pick-up side and right half plane 10R may arrange on an optical axis 25.

[0021] The signal burning detection means 33 for a control section 31 to detect the burning condition of the turn signal of the winker lamp 21, A storage means 34 to memorize the image picturized with image pick-up equipment 11 when the winker lamp 21 is in a burning condition with this signal burning detection means 33, It has a display-control means 35 to choose suitably the image memorized by the storage means 34 based on the detection result of the signal burning detection means 33, and the image pick-up image given from said image pick-up equipment 11, and to display on a display 15.

[0022] It is connected with the network 41 in the car where the winker lamp 21, the turn signal burning switch 37, and the hazard lamp burning switch 39 were connected, and the signal burning detection means 33 detects the hazard lamp burning indication signal transmitted to the winker lamp 21 from the hazard lamp burning switch 39, and transmits that to the display-control means 35 while it detects the turn signal burning indication signal transmitted to the winker lamp 21 from the turn signal burning switch 37.

[0023] Nonvolatile memory, such as SDRAM, etc. is used, and the storage means 34 memorizes the image concerned temporarily, when the image picturized with image pick-up equipment 11 is given from the display-control means 35 (cache).

[0024] The microcomputer with which CPU operates according to the software program beforehand stored in enclosure predetermined [, such as a flash ROM in which the display-control means 35 was built,] is used. And the 1st function in which this software program detects the purport by which the headlight (head lamp) 20 is turned on, When it is the case where the purport by which the headlight 20 is turned on is detected and a turn signal burning indication signal or a hazard lamp burning indication signal is detected by the signal burning detection means 33 To the timing which synchronized synchronizing with the flash period of the winker lamp 21 at the time of burning under flash actuation of the winker lamp 21 The 2nd function to memorize the image picturized with image pick-up equipment 11 in the storage means 34 (cache), When it is the case where the purport by which the headlight 20 is turned on is detected and a turn signal burning indication signal or a hazard lamp burning indication signal is detected by the signal burning detection means 33 The 3rd function which displays the image memorized in the storage means 34 by the frame rate of the flash period (refer to sign Cy in drawing 2) of the winker lamp 21 on a display 15, When the purport by which the headlight 20 is turned on is not detected, Or when a turn signal burning indication signal or a hazard lamp burning indication signal is not detected by the signal burning detection means 33, it is defined as realizing the 4th function which displays

the image picturized with image pick-up equipment 11 on a display 15.

[0025] Actuation of the car circumference check-by-looking equipment of this configuration is explained along with the timing chart of drawing 2. The timing by which, as for drawing 2 (1), an image pick-up image is given to the display-control means 35 of a control section 31 from the image sensor 10 of image pick-up equipment 11 here. The example of timing of turning on and off of a headlight 20 and drawing 2 (3) drawing 2 (2) The example of timing of turning on and off of a turn signal burning indication signal, In drawing 2 (4), the point putting-out-lights timing at the time of the flash of the winker lamp 21 and drawing 2 (5) show the storage timing to the storage means 34 of an image, and drawing 2 (6) shows the image display timing in a display 15, respectively.

[0026] In drawing 1, after beam-of-light 18L corresponding to a left-hand side scene penetrates transparency window part 2L and prism side-face 8L, it advances the interior of prism 4 and reaches prism side-face 8R. And after carrying out internal reflection by this prism side-face 8R, it injects from prism rear-face 8B, image formation is carried out with the image formation lens 9, and it shows around at left half plane 10L of the image pick-up side of an image sensor 10.

[0027] By thinking on this and a symmetrical target, it shows around similarly at right half plane 10R of the image pick-up side of an image sensor 10 about beam-of-light 18R corresponding to a right-hand side scene. And it is changed into a picture signal with both the image sensors 10, and is transmitted to the display-control means 35 of a control section 31.

[0028] Here, when a car 16 is under bright environments, such as Japanese daytime, it is almost the case like the period P1 in drawing 2 (2) that the headlight 20 is usually switched off (OFF). At this time, the display-control means 35 of a control section 31 detects the purport by which the headlight 20 is switched off, and transmits the image picturized with the image sensor 10 of image pick-up equipment 11 to a display 15 by the frame rate as it is irrespective of the existence of a turn signal burning indication signal and a hazard lamp burning indication signal. In a display 15, the image given from the display-control means 35, i.e., the image pick-up image picturized with the image sensor 10, is displayed in the period P1 of drawing 2 (6).

[0029] Moreover, since a headlight 20 is usually turned on like after T1 of drawing 2 (2) when a car 16 is under dark environments, such as night, (ON), the display-control means 35 of a control section 31 detects that. However, unless a turn signal burning indication signal or a hazard lamp burning indication signal flows the network 41 in the car (period P2 reference), the display-control means 35 transmits the image picturized with the image sensor 10 of image pick-up equipment 11 to a display 15 by the frame rate as it is. In a display 15, the image given from the display-control means 35, i.e., the image pick-up image picturized with the image sensor 10, is displayed in the period P1 of drawing 2 (6).

[0030] Here, in T2, if a turn signal burning indication signal is given to the network 41 in the car from the turn signal burning switch 37, the signal burning detection means 33 of a control section 31 will detect that, and it will transmit to the display-control means 35.

[0031] By the way, if a turn signal burning indication signal is given to the winker lamp 21 through the network 41 in turn signal burning switch 37 empty vehicle, the winker lamp 21 will repeat flash actuation the predetermined period Cy like after T2. Then, like the sign 43 in drawing 2 (5), the display-control means 35 of a control section 31 is the predetermined timing within the period Cx which the winker lamp 21 has turned on among the above-mentioned periods Cy, and memorizes the image picturized with image pick-up equipment 11 in the storage means 34 (cache). With the storage means 34, storage maintenance of the given image is carried out until an image is updated next.

[0032] And the display-control means 35 is the frame rate of the flash period Cy of the winker lamp 21, and is displayed on a display 15 by using as a static image the image memorized in the storage means 34. That is, since a display 15 outputs only the static image of one frame to a display 15 per flash period Cy of the winker lamp 21 even if a display 15 carries out image display with a predetermined display clock like the period P3 in drawing 2 (6), at a display 15, the static image memorized by the storage means 34 will be continued and displayed in a period P3 (namely, flash period Cy of the winker lamp 21).

[0033] If it does in this way, even if the winker lamp 21 puts out the light to the timing of T3, the display-control means 35 can continue displaying the image memorized in the storage means 34. Therefore, it can prevent that the image of a display 15 blinks with the flash of the winker lamp 21.

[0034] When time of day furthermore passed, it resulted in T four and the winker lamp 21 lights up again, the display-control means 35 memorizes the image pick-up image newly given from the image sensor 10 of image pick-up equipment 11 at the event for the storage means 34. And the newly memorized image pick-up image is displayed on a display 15, updating for every flash period Cy of the winker lamp 21.

[0035] Then, even if time amount passes with T5 and T6 --, a display 15 repeats displaying the image pick-up image as a still picture updated by the storage means 34 for every flash period Cy of the winker lamp 21 for every flash period Cy.

[0036] As mentioned above, since the display-control means 35 displays the image memorized in the storage means 34 on a display 15 as a static image for every flash period C_y of the winker lamp 21 even if the winker lamp 21 repeats a flash, it can prevent that the image of a display 15 blinks with the flash of the winker lamp 21, and can prevent that the visibility of a display 15 therefore deteriorates.

[0037] in addition -- drawing 2 -- the flash of the winker lamp 21 -- although the storage means 34 was made to memorize the image pick-up image given from the image sensor 10 synchronizing with the time of working burning initiation -- the flash of the winker lamp 21 -- working burning -- as long as it is working, the storage means 34 may be made to memorize the image pick-up image given from the image sensor 10 always

[0038] Or the display-control means 35 displays the image pick-up image given from the image sensor 10 on a display 15 as it is, and you may make it display the image pick-up image memorized by the storage means 34 only at the time of putting out lights of the winker lamp 21 during the burning actuation under flash actuation of the winker lamp 21 at a display 15.

[0039]

[Effect of the Invention] Since according to invention according to claim 1 the static image which the storage means was made to memorize by having used as the static image the image picturized with the image sensor at the time of burning of the winker lamp, and was memorized in the storage means at the time of putting out lights of a winker lamp is displayed on a display when a winker lamp repeats flash actuation, it can prevent that the image of a display blinks with the flash of a winker lamp. Therefore, it can prevent that the visibility of a display deteriorates.

[0040] Since a car presumes that it is put on the bottom of a dark environment, and restricts then and he is trying to do the function of claim 1 so according to invention according to claim 2 when the headlight of a car is on, when a car is under bright environments, such as Japanese daytime, the image picturized with the image sensor can be displayed on a display as it is, and lowering of the frame rate by the display of a still picture can be prevented.

[0041] Since according to invention according to claim 3 a frame rate is reduced and dark change of the image of a display can be prevented when the headlight of a car is on, image quality can be raised by few loads.

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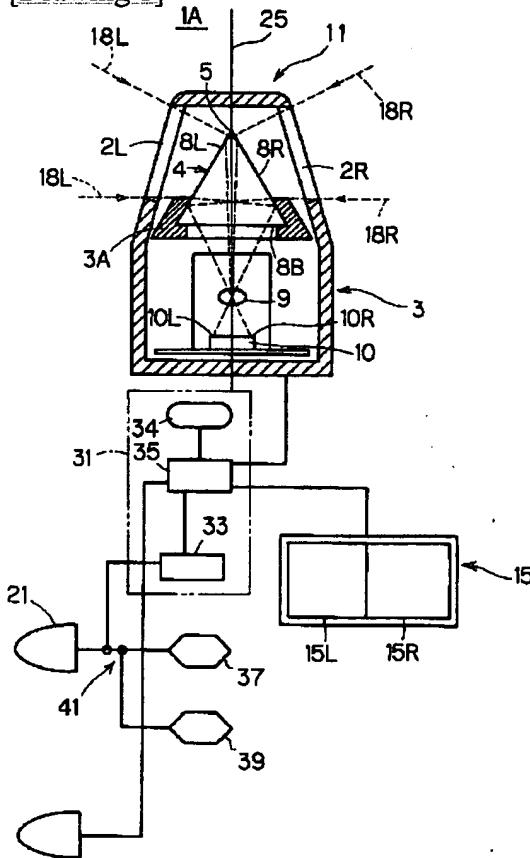
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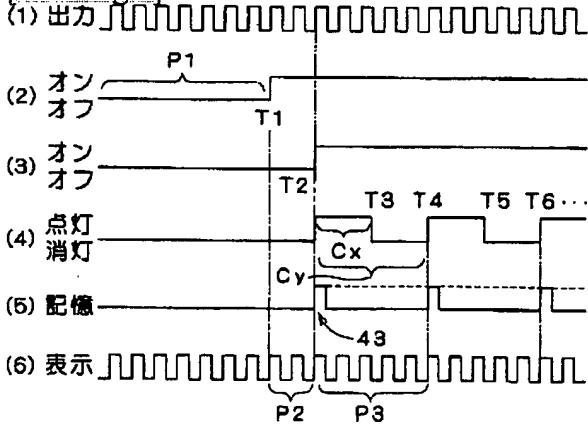
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DRAWINGS

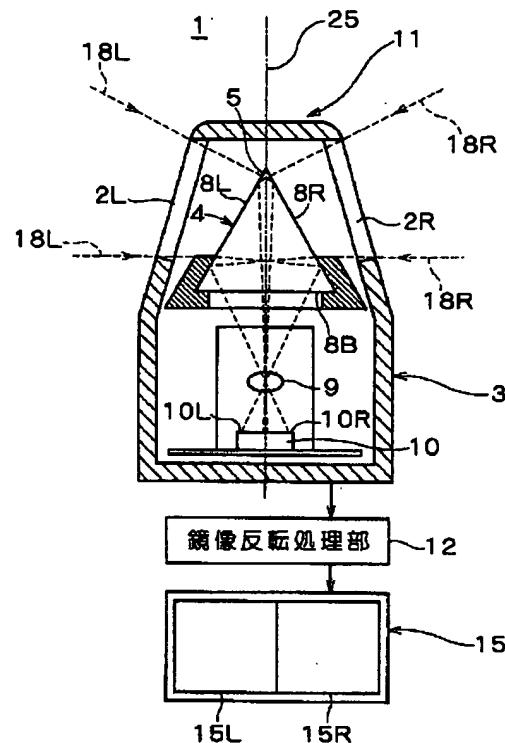
[Drawing 1]



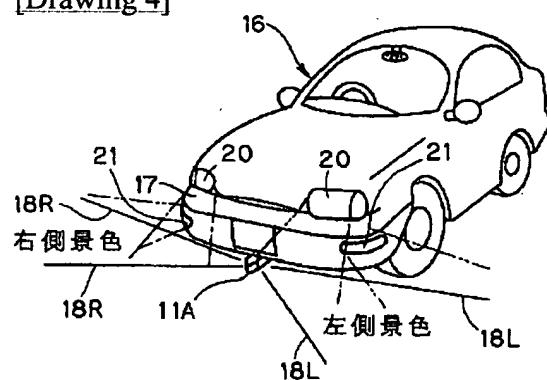
[Drawing 2]



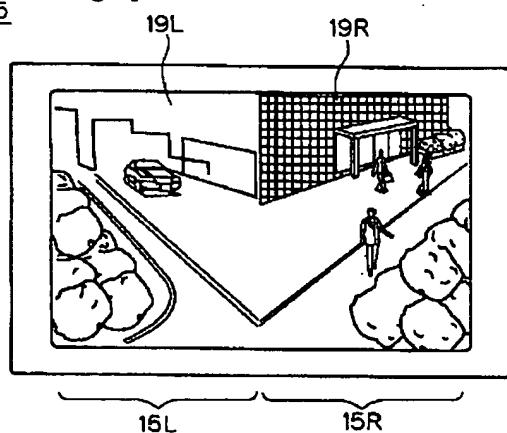
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]